# EFFECT OF LAND CONFIGURATION, VARIETIES AND INTEGRATED NUTRIENT MANAGEMENT ON PROTEIN CONTENT AND YIELD OF *RABI* SORGHUM GROWN ON FLUVENTIC USTOCHREPTS

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## *ABSTRACT*

***A field experiment was conducted during rabi 2010-11 and 2011-12 at Coastal Soil Salinity Research Station, Danti-Umbharat (Navsari Agricultural University, Gujarat) to find out the individual and combined effect of land configuration, variety and integrated nutrient management on quality of sorghum. Land configuration treatments did not exert any significant influence on protein content, while it had significant effect on protein yield during individual years and also in pooled results. Both variety and INM treatments remarkably influenced the protein content and protein yield. Variety GJ 38 showed significantly higher protein content and protein yield than CSV 216R and BP 53. Similarly, application of 100 % RDF along with FYM @ 10 t/ha considerably improved the nutrient uptake by sorghum over 100 % RDF and 75 % RDF along with FYM @ 10 t/ha.***

***KEY WORDS: Integrated Nutrient Management, land configuration, protein, sorgum***

## INTRODUCTION

Sorghum [*Sorghum bicolor* (L.) Moench] is one of the most important cereal crops of the world and fifth largest produced cereal after wheat, maize, rice and barley. It ranks third in acreage and production among the cereals in India. It is grown as post-rainy season crop under stored moisture in medium to deep black soil with a growing period extending from September to January. The moisture and the nutrient management are the two important factors that determine the productivity of *rabi* sorghum. The crop suffers most when it undergoes moisture stress during seedling, flowering and grain formation stages (Hosamani and Chittapur, 1997). The modification in type of sowing from flat bed to raised bed provides better environment for germination, growth, flowering and earhead length, which eventually increase the yield. Inspite of being such an important crop, its yield level is very low in India as compared to USA, USSR, France, Italy, Mexico, Argentina and Australia due to old varieties used by majority of farmers. The improved varieties and hybrids have a great potentiality because of their high yielding capacity, short duration and responsiveness to high fertilization. Application of optimum

quantity of nutrients is also a key to optimize soil moisture of dry lands. It is necessary for the farmers to be aware of the use of inorganic and organic fertilizers in order to save the nitrogen application. Protein content is a important quality trait for determining the nutritive value of the sorghum, considering this the experiment was undertaken.

## MATERIALS AND METHODS

A field experiment was conducted at Coastal Soil Salinity Research Station, Danti-Umbharat (Navsari Agricultural University, Gujarat) during *rabi* 2010-11 and 2011-12 to find out the individual and combined effect of land configuration, variety and integrated nutrient management on quality of sorghum. The experiment was carried out in split plot design. In the main plot, two land configuration and three varieties were applied. In the sub-plots, three levels of integrated nutrient management were applied. The soil of CSSRS, Danti – Umbharat is calcareous with low available nitrogen and high available phosphorus and potassium. The nitrogen content obtained from grains was converted to protein content and protein yield (worked out by multiplying protein content with grain yield) and presented accordingly. The statistical analysis of the data of various observations recorded during investigation was carried through analysis of variance technique as described by Panse and Sukhatme (1985).

## RESULTS AND DISCUSSION

Land configuration did not influenced protein content (Table 1) in sorghum grain significantly, but the effect was significant on protein yield. Significantly superior protein yield was recorded when sorghum was grown on raised bed as compared to flat bed. As protein yield was worked out by multiplying protein content with grain yield, significantly higher grain yield under raised bed treatment also resulted in significantly higher protein yield (302.16 kg/ha)

In case of different varietal treatments, it significantly influenced protein content and protein yield in sorghum grain (Table 1). On the basis of pooled results, variety GJ 38 produced significantly higher protein content (9.43%) and significantly superior protein yield (322.88) in over rest of the varieties. So it can be said that, the improvement in protein content was owing to inherent genetic character of the variety. The protein yield was higher due to higher grain yield.

Different integrated nutrient management treatments also significantly influenced the protein content and protein yield (Table 1). On the basis of pooled results, application of 100 % RDF + FYM @ 10 t/ha was significantly superior over rest of INM treatments. The improvement in protein content in grain was owing to increase in N content in grain because of enhanced availability of this nutrient and improved soil environment with fertilizer and FYM application. Jat *et al.* (2003) and Patidar and Mali (2004) in sorghum also reported the significant response of protein content to nutrient management.

## CONCLUSION

From the results, it can be concluded that land configuration treatments did not exert any significant influence on protein content, while it had significant effect on protein yield. Both variety and INM treatments remarkably influenced the protein content and protein yield. Variety GJ 38 showed significantly higher protein content and protein yield than CSV 216R and BP 53. Similarly, application of 100 % RDF along with FYM @ 10

t/ha considerably improved the nutrient uptake by sorghum over 100 % RDF and 75 % RDF along with FYM @ 10 t/ha.

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**Table 1: Protein content (%) and protein yield (kg/ha) of sorghum as influenced by land configuration, variety and integrated nutrient management**

| Treatments | Protein Content (%) | | | Protein Yield (kg/ha) | | |
|---|---|---|---|---|---|---|
| | 2010-11 | 2011-12 | Pooled | 2010-11 | 2011-12 | Pooled |
| **Land Configuration** | | | | | | |
| $L_1$ | 8.85 | 8.98 | 8.91 | 304.38 | 299.95 | 302.16 |
| $L_2$ | 8.83 | 8.96 | 8.90 | 259.36 | 263.17 | 261.26 |
| S.Em± | 0.11 | 0.10 | 0.08 | 6.67 | 7.87 | 5.16 |
| C.D. (0.05) | NS | NS | NS | 20.09 | 23.73 | 14.90 |
| **Variety** | | | | | | |
| $V_1$ | 9.38 | 9.48 | 9.43 | 318.53 | 327.22 | 322.88 |
| $V_2$ | 7.98 | 8.16 | 8.07 | 251.05 | 246.67 | 248.86 |
| $V_3$ | 9.16 | 9.27 | 9.21 | 276.02 | 270.77 | 273.40 |
| S.Em± | 0.14 | 0.12 | 0.13 | 8.16 | 9.64 | 8.93 |
| C.D. (0.05) | 0.42 | 0.37 | 0.38 | 24.61 | 29.06 | 25.80 |
| C.V. (%) | 7.7 | 6.8 | 7.2 | 14.2 | 16.8 | 15.5 |
| Interactions | NS | NS | NS | NS | NS | NS |
| **Integrated Nutrient Management** | | | | | | |
| $F_1$ | 8.85 | 8.96 | 8.90 | 277.18 | 268.10 | 272.64 |
| $F_2$ | 8.59 | 8.78 | 8.69 | 256.46 | 252.60 | 254.53 |
| $F_3$ | 9.08 | 9.17 | 9.13 | 311.96 | 323.96 | 317.96 |
| S.Em± | 0.10 | 0.11 | 0.07 | 6.20 | 8.07 | 5.09 |
| C.D. (0.05) | 0.30 | 0.31 | 0.21 | 17.77 | 23.16 | 14.35 |
| C.V. (%) | 5.7 | 5.8 | 5.8 | 10.8 | 14.0 | 12.5 |
| Interactions | NS | NS | NS | NS | NS | NS |

***$L_1$: Raised bed,*** ***$V_1$: GJ 38,*** ***$F_1$: 100 % RDF (80 : 40 : 00 NPK kg/ha),***
***$L_2$: Flat bed;*** ***$V_2$: CSV 216R,*** ***$F_2$: 75 % RDF + FYM @ 10 t/ha,***
***$V_3$: BP 53;*** ***$F_3$: 100 % RDF + FYM @ 10 t/ha***

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